Claims

I claim:

1. A method for providing a propulsion hydrofoil, comprising:

(a) providing said hydrofoil with a blade member connected to a predetermined body, said blade member having an attacking surface, a lee surface, outer side edges, a root portion near said predetermined body and a free end portion spaced from said predetermined body, said blade member having a predetermined length between said root portion and said free end portion, said blade member having a longitudinal midpoint between said root portion and said free end portion, said blade member having a first half blade portion between said root portion and said longitudinal midpoint and a second half portion between said longitudinal midpoint and said free end portion, said blade member having sufficient flexibility to bow between said outer side edges to form a longitudinal channel shaped contour, said longitudinal channel shaped contour extends from said free end portion toward said root portion to base of said longitudinal channel shaped contour, said base being located a predetermined distance from said predetermined body, said longitudinal channel shaped contour having a predetermined longitudinal dimension between said free end portion and said base;

(b) providing said first half blade portion of said blade member with sufficient flexibility to experience a predetermined lengthwise deflection from a predetermined neutral orientation to a predetermined reduced lengthwise angle of attack around a transverse axis during use, said transverse axis being located within said first half portion of said blade member;

(c) providing said blade member with sufficient spring-like tension during said predetermined lengthwise deflection so as to permit said blade member to experience a significantly strong snapping motion from said predetermined lengthwise deflection toward said predetermined neutral position;

(d) controlling the build up of longitudinally directed compression forces within said blade member sufficiently to permit said predetermined longitudinal dimension of said channel shaped contour to extend over a majority of said predetermined length of said blade member as said channel shaped contour experiences said

predetermined lengthwise deflection to said predetermined reduced lengthwise angle of attack during use.

2. The method of Claim 1 wherein said blade member includes a stopping device arranged to prevent said predetermined lengthwise reduced angle of attack from reaching an excessively reduced angle that is not efficient at generating propulsion.

3. The method of Claim 1 wherein said snapping motion is sufficient to reduce the occurrence of lost motion during the inversion portion of a reciprocating stroke cycle.

4. The method of Claim 1 wherein spring-like tension is created as a portion of said blade member is forced to experience elastic elongation of at least 2% during said predetermined deflection.

5. The method of Claim 1 wherein spring-like tension is created as a portion of said blade member is forced to experience elastic elongation of at least 10% during said predetermined deflection.

6. The method of Claim 1 wherein a region of reduced material is disposed within said blade member near said base of said longitudinal channel shaped contour, said region of reduced material being arranged to permit said blade member to move sufficiently toward said predetermined body during said predetermined lengthwise deflection to significantly reduce the tendency for said blade member to experience lengthwise buckling between said base and said free end portion of said blade member.

7. The method of Claim 6 wherein said region of reduced material is a flexible region of reduced thickness within said blade member arranged to buckle around a relatively small radius near said base so as to relieve said longitudinally directed compression forces created within said channel shaped contour during said lengthwise deflection.

8. The method of Claim 6 wherein said region of reduced material is a gap having sufficient longitudinal dimension to prevent said blade member from pressing excessively against said predetermined body.

9. The method of Claim 1 wherein a plurality of angled stiffening members are disposed within said blade member and arranged to substantially reduce the tendency for said blade member to experience excessive buckling along said predetermined longitudinal dimension of said channel shaped contour.

10. The method of Claim 1 wherein a plurality of stiffening members are disposed within said blade member and arranged in a substantially staggered manner to substantially reduce the tendency for said blade member to experience excessive buckling along said predetermined longitudinal dimension of said channel shaped contour.

11. The method of Claim 10 wherein said blade member has a lengthwise alignment and at least one of said plurality of stiffening members is oriented at an angle to said lengthwise alignment.

12. The method of Claim 1 wherein two elongated stiffening members are connected to said blade member near said outer side edges, said elongated stiffening members having at least one notch.

13. The method of Claim 12 wherein said elongated stiffening members are formed within a thermoplastic material having a significantly high modulus of elasticity at said notch.

14. The method of Claim 1 wherein two elongated stiffening members are connected to said blade member near said outer side edges, said elongated stiffening members having an upper surface portion and a lower surface portion, said upper surface portion having a upper surface notch, said upper surface notch having an upper notch longitudinal dimension and an upper notch vertical depth, the ratio between said upper notch longitudinal dimension and said upper notch vertical depth being at least 3 to 1.

15. The method of Claim 14 wherein said ratio is not less that 4 to 1.

16. The method of Claim 14 wherein said lower surface portion of said elongated stiffening members have a lower surface notch having a lower notch longitudinal dimension and a lower notch vertical depth, said lower notch longitudinal dimension being different than said upper notch longitudinal dimension.

17. The method of Claim 14 wherein said lower surface portion of said elongated stiffening members have a lower surface notch having a lower notch longitudinal dimension and a lower notch vertical depth, said lower notch vertical depth being different than said upper notch vertical depth.

18. The method of Claim 12 wherein said notch is near said root portion.

19. The method of Claim 12 wherein said notch is near said base.

20. The method of Claim 1 wherein said blade member is arranged to have sufficient flexibility along said predetermined longitudinal dimension to permit said blade member to form an S-shaped sinusoidal wave during the inversion portion of a reciprocating propulsion stroke, said blade member is arranged to control said longitudinally directed compression forces sufficiently to permit said blade member to form said channel shaped contour as said S-shaped sinusoidal wave is created.